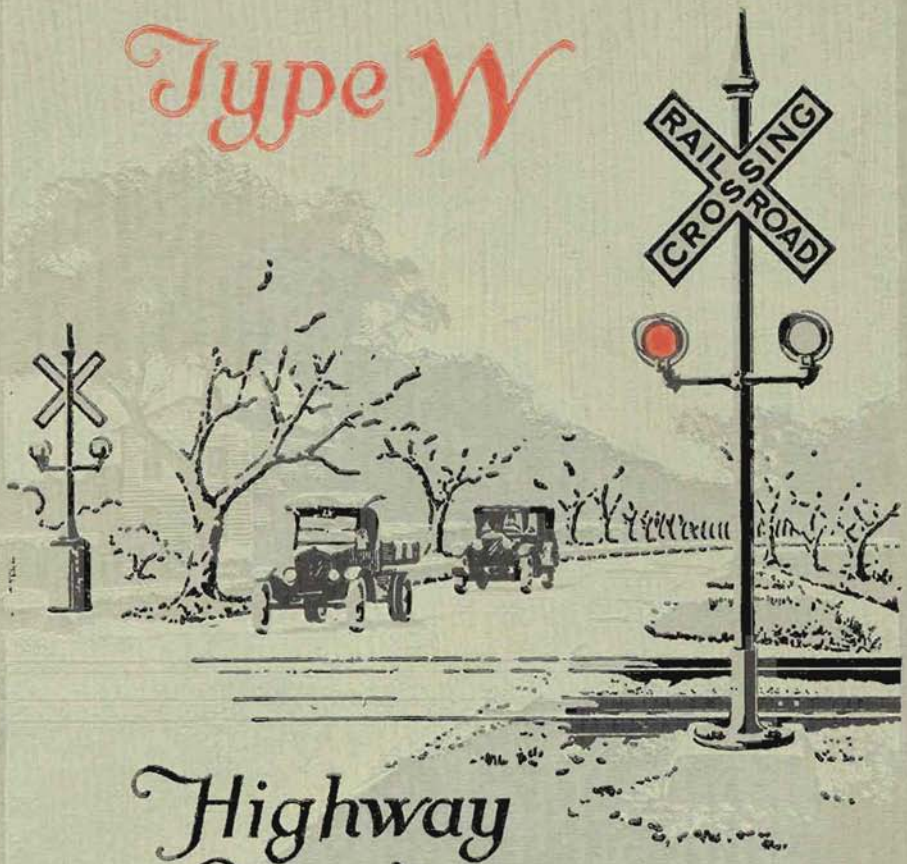
Type W



Highway Crossing Signal

THE TYPE W HIGHWAY CROSSING SIGNAL

BULLETIN 157
MARCH, 1928

GENERAL RAILWAY SIGNAL COMPANY
ROCHESTER, N.Y.

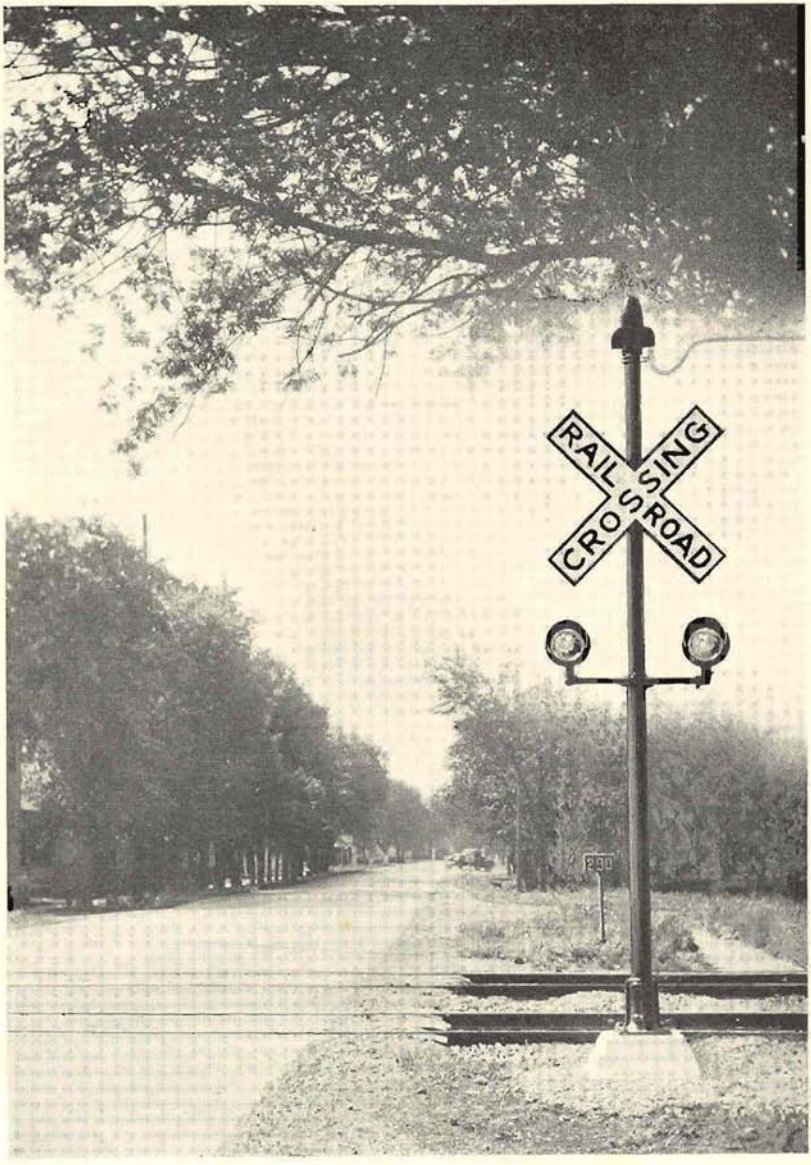


FIGURE 1. TYPE W FLASHING LIGHT HIGHWAY CROSSING SIGNAL, ELGIN, JOLIET & EASTERN RAILWAY. A SIMILAR SIGNAL, NOT SHOWN, IS LOCATED ON OTHER SIDE OF HIGHWAY.

The Type W Highway Crossing Signal

THE improvement of many highways and the increase in automobile traffic is making unusual demands on railroads for protection at highway crossings. The G-R-S Type W Highway Crossing Signal provides a very effective and dependable means of securing this protection at low cost.

The design of this signal, as well as its operation has been made unusually simple and it may be installed in a number of different ways to meet the requirements of individual locations.

During recent years the Flashing Light Type of Highway Crossing Signal has come into extensive use. It gives an indication that is distinctive in character from those employed in street traffic signaling. It meets the requirements of Public Service Commissions in most of the States of the United States and has the approval of the Signal Section of the American Railroad Association.

Figure 1 is a typical installation of the Type W Signal arranged as a Flashing Light Signal. It consists of a durable cast-iron sign lettered "Railroad Crossing" and two light-units spaced two feet, six inches apart horizontally on a cross-arm mounted to a four inch post. The light-units are controlled in a very simple and dependable manner through the contacts of a direct current, slow release, flashing relay to flash alternately at the approximate rate of 32 times per minute. The indication displayed presents the appearance of an intense red light swinging first to one side and then the other—a danger signal that is well understood.

When located in the center of the highway, the signal is usually mounted on a substantial concrete base which projects about two and one half feet above the road surface and serves as a buffer for the protection of the signal.

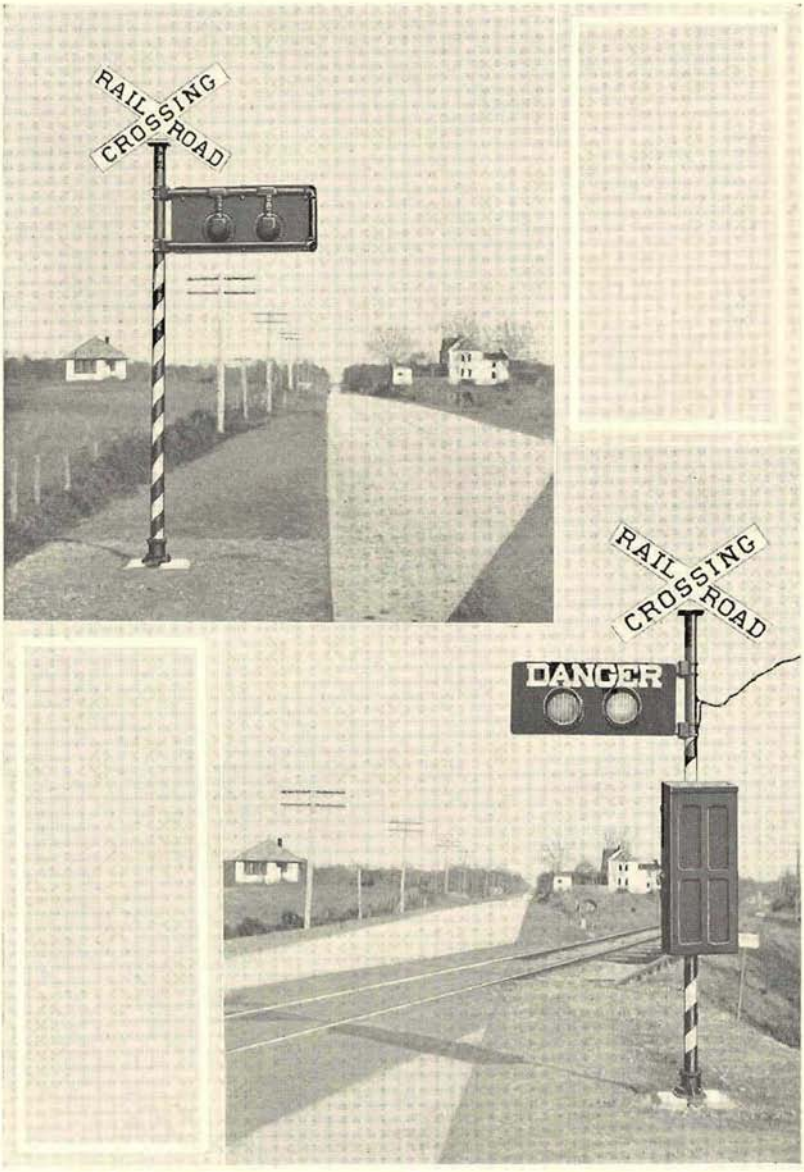


FIGURE 2. TYPE W HIGHWAY CROSSING SIGNAL, SOUTHERN RAILWAY. THIS INSTALLATION EMPLOYS A NON-FLASHING RED INDICATION FOR "STOP" AND A GREEN INDICATION FOR "GO."

Suitable markers are employed to indicate the location of the signal at night. The reflector marker, as shown in Figure 9, is recommended for such locations.

If side lights are desired so that the operation of the signal can be observed from the track, the signal units can be so furnished.

Contrary to the idea that signals used for the protection of highway traffic at railroad crossings should give indications which are distinctive in character, some signal engineers and others believe that the indications of such signals should conform with those in general use for the control of traffic at important street intersections.

The general use of traffic signals which give a red indication for "stop" and a green indication for "go," has caused the public to become thoroughly familiar with the meaning of these color indications.

The Type W Signal arranged to give a red indication for "stop" and a green indication for "go" is being used effectively to protect highway traffic at a number of railroad crossings, one of which is shown in Figure 2. In this signal, a black background bearing the word "DANGER" is provided for the two Type W Light-Units which are spaced one foot, three inches apart horizontally or vertically, as desired. The background and units are supported by a simple pipe bracket which is clamped to a three inch post. The light units are equipped with 8⅜" standard doublet lenses as illustrated in Figure 7.

The signal normally displays a green indication when no train is approaching and a red indication upon the approach of a train. Plate H2905, included as a part of this bulletin, shows the construction of the signal in detail and gives order references for it.

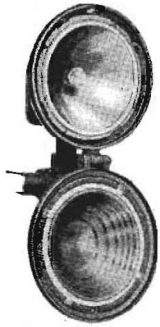


FIGURE 3. TYPE W LIGHT UNIT, FRONT DOOR OPEN

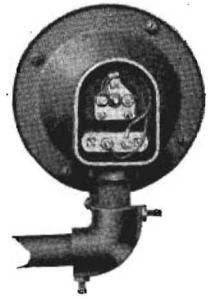


FIGURE 4. TYPE W LIGHT UNIT, REAR DOOR OPEN

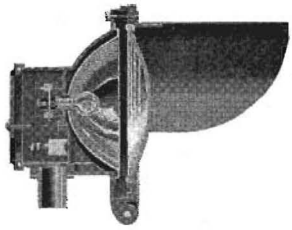


FIGURE 5. SHOWING CONSTRUCTION OF UNIT HAVING REFLECTOR AND 8 3/8" ROUNDEL. FOR MOUNTING ON TOP OF CROSS ARM.

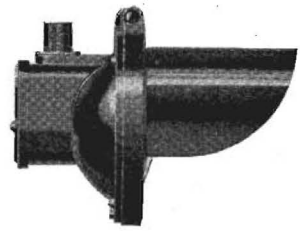


FIGURE 6. SHOWING UNIT FOR SUSPENDING FROM CROSS ARM.

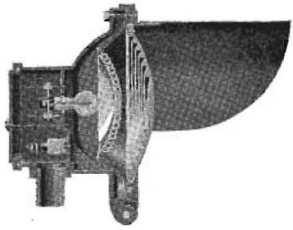


FIGURE 7. SHOWING CONSTRUCTION OF UNIT WITH 8 3/8" DOUBLET LENS. FOR MOUNTING ON TOP OF CROSS ARM.

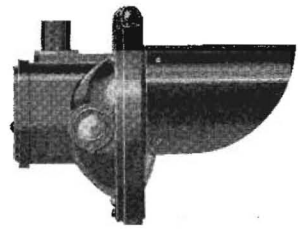


FIGURE 8. TYPE W LIGHT UNIT WITH SIDE LIGHTS. FOR SUSPENDING FROM CROSS ARM.

Light-Units

EACH light-unit is easily adjusted in either the horizontal or vertical plane. The main door of the unit opens in front giving access to the lamp, reflector and lens, as shown by Figure 3. A small door in the rear provides easy access to the terminals and adjustable lamp receptacle mounting, as shown in Figure 4. The units may be supplied for mounting on the cross-arm as shown by Figure 1 or they can be suspended from the cross-arm.

Optical Construction of Light-Units

THE TYPE W LIGHT-UNIT may be supplied with the optical arrangement illustrated in Figure 5, with the lamp filament located at the focal point of a high grade glass reflector which projects the light beam through an 8⅜" red Spredlite roundel, or the unit may be supplied with the arrangement illustrated in Figure 7, with the lamp filament placed at the focal point of an 8⅜" doublet lens consisting of an inner colored lens and an outer Spredlite clear lens.

Either of these optical arrangements may be used where the signal is to be operated as a flashing signal but if the signal is to give a red indication for stop and a green indication for proceed, the doublet lens combination is recommended due to its freedom from phantom indications.

The light beam from either of the arrangements described has a spread of 15° to each side or a total spread of 30°. (Beam spread is understood to refer to the point at the angle mentioned where the intensity of the beam is 50% of the axial beam under normal conditions and is for the pur-

pose of covering the approach to the crossing with a good indication.)

Side lights, when specified, will be supplied in units having either the reflector or the doublet lens. A unit equipped with side lights is illustrated in Figure 8.

Lamps

THE Type W Signal employs the S-11 bulb, single contact, bayonet base type of lamp having a single concentrated filament. These lamps are especially made for signal service and are furnished in ratings suitable for use with either a 6-8 volt storage battery or a 12 volt storage battery as specified.

We recommend that lamps be burned slightly under rated voltage as this increases the life of the lamp and provides a light beam of ample intensity for a good signal indication.

Reflector Marker Unit

THIS UNIT provides an effective marker for signals located in the center of the highway. No lamp is required. The light from the headlights of an approaching automobile is reflected back to the driver so that the entire area of the unit appears filled with light. Each marker consists of one, two or three reflectors, as specified, with the necessary brackets for either mounting to the base of the post or to the post just above the base. Each reflector is an independent unit, approximately 4″ x 11″ in size, consisting of thick moulded glass with its support and protecting mesh

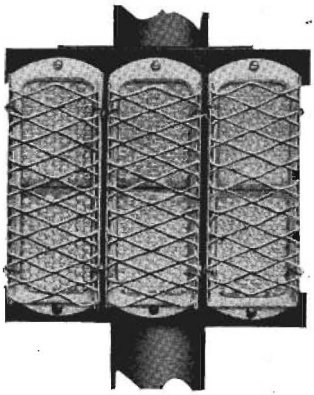


FIGURE 9. THREE-UNIT REFLECTOR MARKER

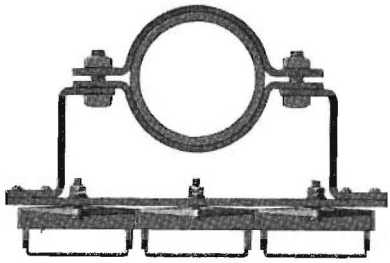


FIGURE 10. MOUNTING BRACKET FOR REFLECTOR MARKER

guard. The glass is especially moulded to present a reflecting surface which is effective, even when the marker is approached from a considerable angle. Reflectors are furnished clear, yellow or red as desired.

Circuits

TYPICAL circuits for the control of flashing light highway crossing signals on single track are shown by Figures 11 and 12. Each piece of apparatus used in the circuits is labeled and the relays, transformers, etc., are illustrated and described in the following pages.

Where alternating current is available, a very economical and dependable control is obtained by the use of circuit Figure 11, which employs a storage battery on trickle charge from alternating current to operate the flashing relay, the lamps being fed normally from the Alternating

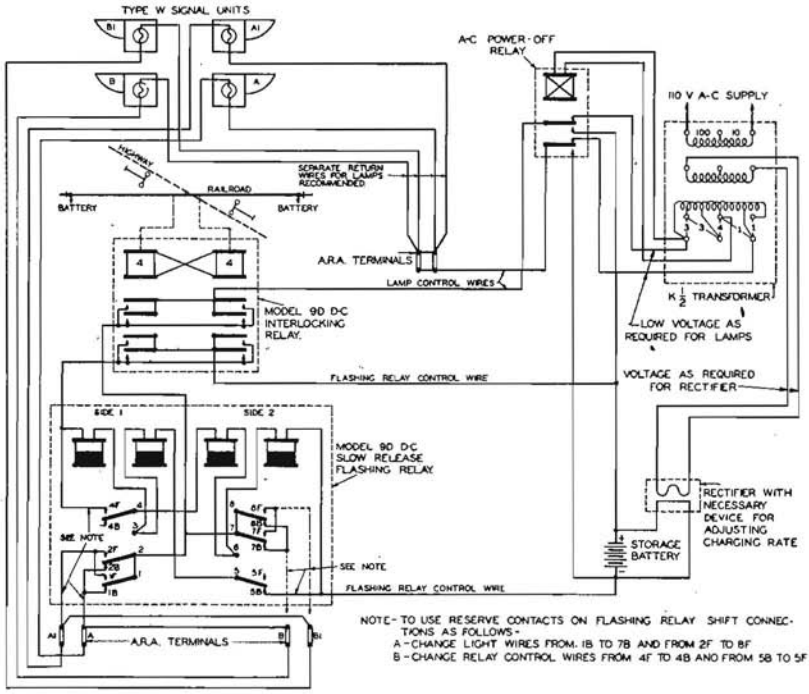

TYPE W SIGNAL UNITS
A-C POWER-OFF RELAY
110 V A-C SUPPLY
SEPARATE RETURN WIRES FOR LAMPS RECOMMENDED
HIGHWAY
RAILROAD
BATTERY
BATTERY
A.R.A. TERMINALS
LAMP CONTROL WIRES
K TRANSFORMER
LOW VOLTAGE AS REQUIRED FOR LAMPS
MODEL 90 D-C INTERLOCKING RELAY
FLASHING RELAY CONTROL WIRE
VOLTAGE AS REQUIRED FOR RECTIFIER
SIDE 1
SIDE 2
MODEL 90 D-C SLOW RELEASE FLASHING RELAY
RECTIFIER WITH NECESSARY DEVICE FOR ADJUSTING CHARGING RATE
STORAGE BATTERY
SEE NOTE
SEE NOTE
FLASHING RELAY CONTROL WIRE
A.R.A. TERMINALS
NOTE - TO USE RESERVE CONTACTS ON FLASHING RELAY SHIFT CONNECTIONS AS FOLLOWS -
A - CHANGE LIGHT WIRES FROM 1B TO 7B AND FROM 2F TO 8F
B - CHANGE RELAY CONTROL WIRES FROM 4F TO 4B AND FROM 5B TO 5F

FIGURE 11. TYPICAL CIRCUIT FOR THE CONTROL OF FLASHING LIGHT HIGHWAY CROSSING SIGNALS ON SINGLE TRACK WHERE ALTERNATING CURRENT IS AVAILABLE.

Current and cut-over to the storage battery by a power-off relay upon failure of the A-C supply.

Where alternating current is not available, the circuit shown in Figure 12 is recommended. This circuit employs a storage battery on trickle charge from a primary battery, the flashing relay being controlled directly from the storage battery, and the lamps being fed from the same source.

The relay housing shown as a part of Type W Signal Complete, Plate H2903, Figure C, makes a very neat and

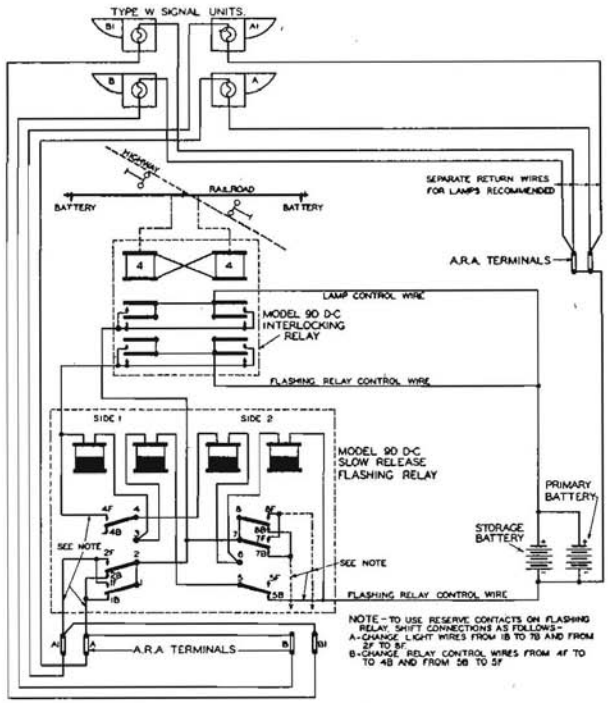


FIGURE 12. TYPICAL CIRCUIT FOR THE CONTROL OF FLASHING LIGHT HIGHWAY CROSSING SIGNALS ON SINGLE TRACK WHERE ALTERNATING CURRENT IS NOT AVAILABLE.

satisfactory housing for the control apparatus. If it is desired to bring wires from a pole line into the top of the 4 inch post supporting the signal, the post is ordered the proper length equipped with cap, Figure 14, shown on this same plate. Where the signals are located in the center of the highway, it is usually more desirable to separate the relay case from the signal. Reference 9a, Plate H2903, will obtain the relay case only equipped with a cover plate.

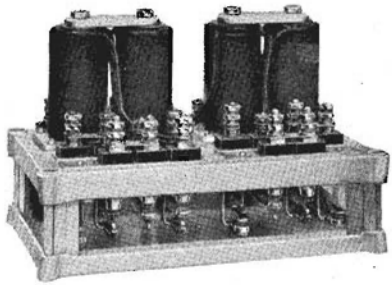


FIGURE 13. MODEL 9-D, SLOW RELEASE, D-C FLASHING RELAY.

Model 9-D Direct-Current Flashing Relay

THE Model 9-D Flashing Relay is of high quality, equal in every respect to other relays manufactured by this company for the control of railway signals. It provides a simple and dependable means of interrupting the current to the lamps of the flashing light signal. The application of the relay is shown in the typical circuits, Figures 11 and 12, and its construction is described as follows:

Two slow-releasing direct-current relays are mounted on the same base as shown in Figure 13, the coils of one being energized through the contacts of the other to produce alternate operation of each relay. With the coils regularly furnished, approximately 32 operations or flashes per minute are produced on the operating voltage specified.

The resistances are as follows:

OPERATING VOLTAGE	RESISTANCE PER SIDE OF RELAY	RESISTANCE PER COIL
10 to 12	1000	500
8 to 10	800	400
6 to 8	540	270
4 to 6	300	150

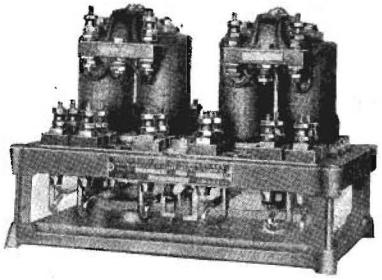


FIGURE 14. MODEL 9-D INTERLOCKING RELAY, D-C.

The contacts regularly supplied are intended for the interrupted breaking of current to low voltage lamps (not to exceed 30 volts). Two contacts are connected in multiple for each lamp circuit, one contact being graphite to graphite which makes first and breaks last, taking the arc, the other contact being silver to silver, to insure low contact resistance for the lamp circuit.

The relay is furnished with a complete set of reserve contacts which may be placed in service by shifting connections as indicated on typical circuits, Figures 11 and 12.

Simply order Model 9-D Direct-Current Flashing Relay and specify voltage on which the relay is to operate.

Model 9-D Interlocking Relay

THE Model 9-D Direct-Current Interlocking Relay is designed for the control of highway crossing signals on single track. It consists of two standard relays mounted side by side on the same base, standard armatures being used and interlocked with each other through a simple and dependable arrangement.

The operation is described as follows:

1st Normally, the coils for both relays are energized and all front contacts are closed.

2nd The dropping of the armature of either relay will close its back contacts and place the interlocking parts in position to prevent the back contacts of the other relay from closing when its armature drops.

3rd With energy restored to the coils of the first relay, its front contacts close and the back contacts open while the armature of the second relay is locked in mid position, i.e., with both front and back contacts open.

4th When the energy is then restored to the second relay with the first relay energized, the interlocking arrangement is restored to normal and is in position for operation from either relay as before.

STANDARD RESISTANCES IN OHMS				
2	9.2	126	430	960
4	16.0	194	500	1360
6	55.0	280	640	

The Model 9-D Interlocking Relay has a contact capacity of four front and back contacts on each side. Dependent front and back, or independent front or back contacts may be located in any contact space. Front contacts are regularly furnished copper-carbon post to silver finger and back contacts, silver finger to silver post.

Simply order Model 9-D Direct-Current Interlocking Relay, specifying the resistance of relay and contacts required.

The Type H Power-Off Relay

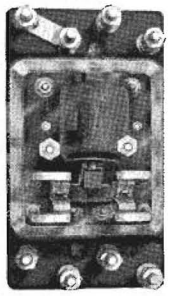


FIGURE 15. TYPE H POWER-OFF A-C RELAY.

THE TYPE H RELAY was developed for the specific purpose of feeding signal lamps normally from an A-C source of supply and of cutting in a storage battery or other reserve supply when the A-C source is interrupted. The application of this relay is shown in typical circuit, Figure 11.

The Type H Relay has a moulded porcelain base with terminal heads and wiring deeply recessed, assuring freedom from grounds. The laminated armature structure is free moving and self aligning, which insures noiseless operation. The contact equipment consists of two substantially constructed dependent front and back contacts. The relay is completely enclosed in a dust-proof moulded glass cover.

Simply order Type H Power-Off Relay, specifying voltage and frequency of A-C Current and voltage on which signal lamps are to operate.

Type K½ Transformer Storage Battery and Rectifier

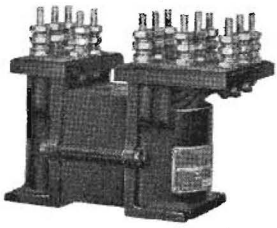


FIGURE 16. TYPE K½ TRANSFORMER.

THE TYPE K½ TRANSFORMER is employed in the control of highway crossing signals where storage battery is charged thru a rectifier as shown in Figure 11. It is a small air-cooled transformer 4½" wide by 5⅜" long,

having a 110-volt primary and one or two secondary windings with taps of the proper voltage for charging the storage battery and feeding the lamps.

In ordering the Type K½ Transformer, Storage Battery and Rectifier give the following information:

(*a*) Voltage and frequency of alternating current.
(*b*) Rating of lamps to be used in signal.
(*c*) Ampere-hour capacity of Storage Battery.

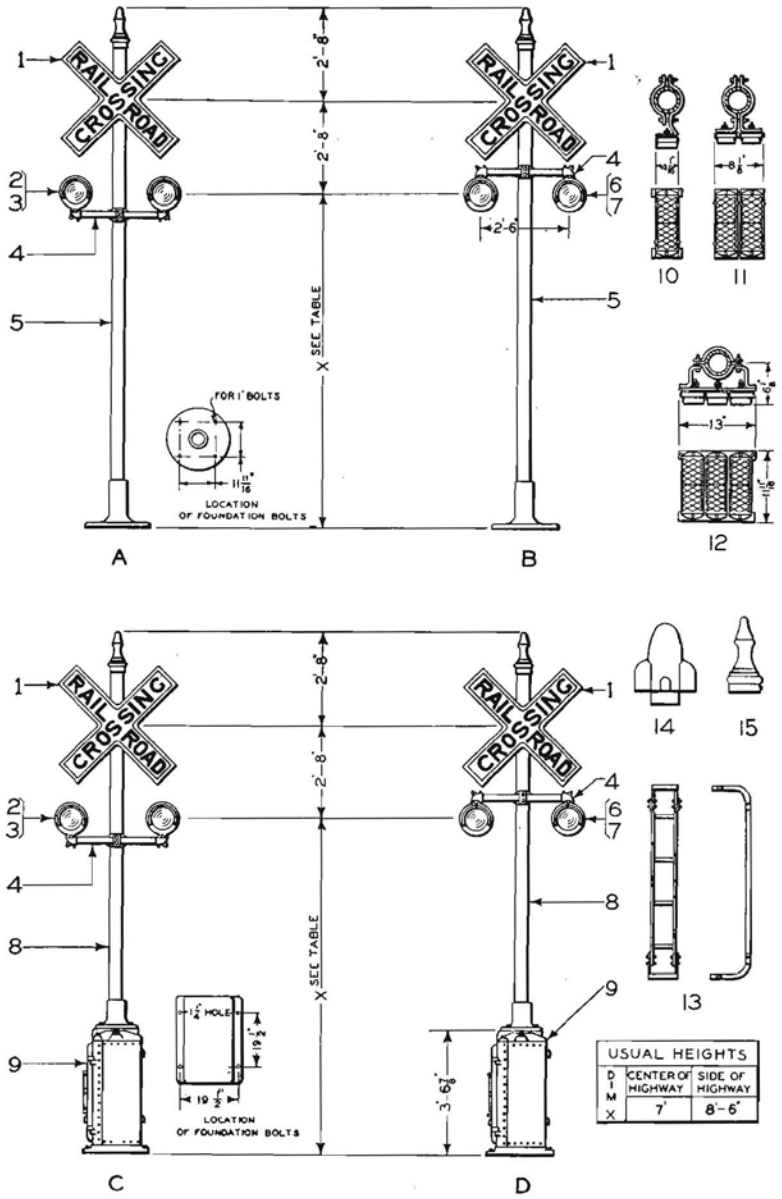
Other Accessories for Highway Crossing Signals

Direct-Current Relays for track or line circuits. See G-R-S Catalog, E Volume 1, Section E.

Alternating-Current Relays for track or line circuits. See G-R-S Catalog, E Volume 4, Section N.

Relay Housings in wood or iron for any grouping of relays and other equipment. See G-R-S Catalog, E Volume 1, Section E.

CATALOG SECTION



TYPE W HIGHWAY CROSSING SIGNALS

TYPE W HIGHWAY CROSSING SIGNALS

NOTE: Side lights shown in Figure 8, page 6, are furnished only when specified. If markers shown in Figures 10, 11 and 12, this plate, are desired same must be ordered separately.

Ladder shown in Figure 13, this plate, will be furnished only when specified. If it is desired to bring line wires into top of signal, specify length of 4″ post required and order cap, Figure 14, this plate.

Lamps are not included with signals complete. Order separately, giving voltage of storage battery to be used with signal.

Drawing references are shown for convenience in checking shipping lists and invoices

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type W Flashing-light Highway Crossing Signal Complete, as shown, having units equipped with 8⅜″ red spredlite roundels and reflectors. See Figures 4 and 5 on page 6 for construction of unit. Specify dimension X.....	
A1	as above, except having units equipped with 8⅜″ red doublet lenses. See Figure 7 on page 6, for construction of unit.....	
A2	same as Figure A1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal.....	
B	Type W Flashing-light Highway Crossing Signal Complete, as shown, having units equipped with 8⅜″ red spredlite roundels and reflectors. See Figs. 4 and 5 on page 6 for construction of unit. Specify dimension X.....	
B1	as above, except having units equipped with 8⅜″ red doublet lenses. See Figs. 6 and 7 on page 6 for construction of unit.....	
B2	same as Fig. B1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
C	Type W Flashing-light Highway Crossing Signal Complete mounted on relay case as shown. Light units are equipped with 8⅜″ red spredlite roundels and reflectors. See Figures 4 and 5 on page 6 for construction of unit. Specify dimension X.....	

TYPE W HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

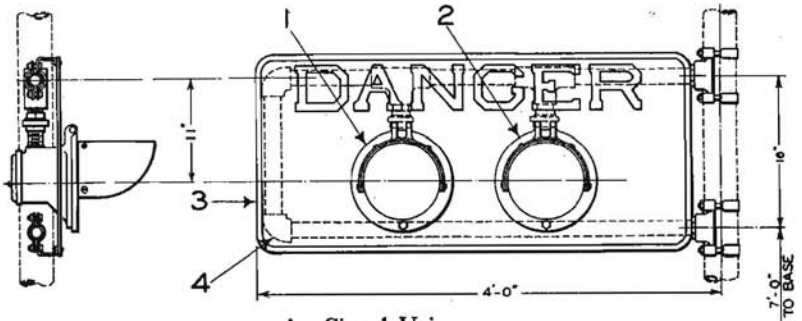
FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
C1	ss above, except having units equipped with 8 3/8" red doublet lenses. See Figs. 6 and 7 on page 6, for construction of unit	
C2	same as Fig. C1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
D	Type W Flashing-light Highway Crossing Signal Complete mounted on relay case as shown. Light units are equipped with 8 3/8" red spredlite roundels and reflectors. See Figs. 4 and 5 on page 6 for construction of unit. Specify dimension X.	
D1	as above except having units equipped with 8 3/8" red doublet lenses. See Figs. 6 and 7 on page 6, for construction of unit	
D2	same as Fig. D1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
1	Railroad Crossing Sign, cast iron, has raised border and letters which are painted black on a white background unless otherwise specified. Includes two U bolts for mounting to 4" pipe	20896-5 31359
2	Type W Color-light Signal Unit Complete for mounting on top of cross-arm, equipped with 8 3/8" dia., red spredlite roundel and reflector	53125-1 Gr. 1
3	Type W Color-light Signal Unit Complete for mounting on top of cross-arm, equipped with a doublet lens combination of an inner, 5 1/2" dia., red lens and an outer 8 3/8" dia., clear spredlite lens	53125-1 Gr. 2
3a	as above, except inner lens green in place of red.	
4	Cross-Arm Complete, for supporting light units.	48870-5 Gr. 1
5	Mast Complete of 4" pipe, with base and cap as shown. Specify length	
6	Type W Color-light Signal Unit Complete for suspending from cross-arm, equipped with 8 3/8" dia., red spredlite roundel and reflector	

TYPE W HIGHWAY CROSSING SIGNAL

Drawing references are shown for convenience in checking shipping lists and invoices

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
7	Type W Color-light Signal Unit Complete for suspending from cross-arm, equipped with a doublet lens combination of an inner 5½″ dia., red lens and an outer 8⅜″ dia., clear spredlite lens	
7a	as above, except inner lens green in place of red.	
8	Mast Complete, of 4″ pipe, with base and cap as shown for mounting on top of relay case. Specify length	
9	Relay Case Complete as shown, equipped with three shelves	
9a	as above, except with cover for use without mast.	
10	Reflector Unit Complete, with one yellow reflector and clamps for attaching to 4″ pipe. When specified clamps can be furnished for mounting to base	53276 Gr. 3
10a	as above, except with red reflector	53276 Gr. 2
10b	same as Fig. 10, except with clear reflectors	53276 Gr. 1
11	Reflector Unit Complete, with two yellow reflectors and clamps for attaching to 4″ pipe. When specified clamps can be furnished for mounting to base	53276-1 Gr. 3
11a	as above, except with red reflectors	53276-1 Gr. 2
11b	same as Fig. 11, except with clear reflector	53276-1 Gr. 1
12	Reflector Unit Complete, with three yellow reflectors and clamps for attaching to 4″ pipe. When specified clamps can be furnished for mounting to base	53276-2 Gr. 3
12a	as above, except with red reflectors	53276-2 Gr. 2
12b	same as Fig. 12, except with clear reflectors	53276-2 Gr. 1
13	Ladder Complete, as shown, with clamps for attaching to 4″ pipe. Specify length	
14	Pinnacle and Cap, for use as wire inlet, for 4″ pipe	30391 36288
15	Pinnacle, as shown, for 4″ pipe	1661

TYPE W TWO-INDICATION HIGHWAY CROSSING SIGNAL



A - Signal Unit

NOTE: References given below do not include posts, bases, relay cases or lamps for light units, which must be ordered separately.
See Catalog E, Volume 1, Plate E0701 for posts and bases, Plate E0903 for relay cases.
In ordering lamps give voltage of storage battery to be used with signal.
Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type W, Two-Indication, Highway Crossing Signal Unit Complete, consisting of two doublet lens light units, background, and pipe bracket with clamps for mounting to 3″ pipe, as shown. This signal unit is equipped for giving red and green indications	
A1	as above, except for mounting to 4″ pipe	
1	Type W Light-Unit Complete, equipped with an 8 3/8″ doublet lens, consisting of an inner red lens and an outer spredlite clear lens	53125-2 Gr. 3
2	Type W Light-Unit Complete, equipped with an 8 3/8″ doublet lens, consisting of an inner green lens and an outer spredlite clear lens	53125-2 Gr. 4
3	Background, black with the word "DANGER" and border painted in white	49162-37
4	Bracket Complete, with clamps for mounting to 3″ pipe. Includes all fittings for attaching light units and background	
4a	as above, except for mounting to 4″ pipe	

Principal Office and Works

General Railway Signal Company
Rochester, New York

District Offices

PEOPLES GAS BUILDING
122 South Michigan Avenue, Chicago, Illinois

PERSHING SQUARE BUILDING
100 East 42nd Street, New York, New York

RAILWAY EXCHANGE BUILDING
611 Olive Street, St. Louis, Missouri

Associate Companies

METROPOLITAN VICKERS-GRS., LTD.
Head Office, 9 Kingsway, London, W.C. 2

COMPAGNIE FRANCAISE THOMSON-HOUSTON
173 Boulevard Haussmann, Paris, France

GENERAL RAILWAY SIGNAL COMPANY
PTY. LTD.
Melbourne, Australia

GRS